

Fifth problem set

Due date: 2019.03.28, 9.00

Topic: permutation representation

You have to send your solutions via email (evolalghf@gmail.com). You have to solve them unassisted, unless it's marked with a star. The problems marked * can be solved in groups of two. You can get maximum 10 points.

1. (6 points) Prove the following statement: 'If we can find a Hamiltonian cycle in a digraph in polynomial time, then using this algorithm we can find a Hamiltonian cycle in a graph.'

Is the statement: 'If we can find a Hamiltonian cycle in a graph in polynomial time, then using this algorithm we can find a Hamiltonian cycle in a digraph' true?

2. (4 points) Let us suppose, that we use one of the four crossover operator (CX, OX, PMX, EX) for 9-long permutation pairs, the matching segment is the 4-7. positions if there is any. Is it possible, that that the two parents aren't identical, but the offspring is identical to one of the parents?
3. (10 points)* Consider 9-long permutations. Applying CX operator, the permutation pair is divided to cycles. Count the number of cycles for 10^6 random permutation pairs and make a histogram of the distribution of the number of cycles.